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20/Petition

U.S. Patent and Trademark Office,
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Washington, D.C. 20231

Attention:
Examiner, Timothy C. Vanoy,
Supervisor: Stanley Silverman

Art Unit: 1754

Applicants:
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Appl.#:09/525,176
Filing date:03/14/2000

Continuation in Part of Application 08/595,040
Now US Patent 6,090,312

April 04, 2003

Addendum to the Response faxed to the USPT Office on March 28, 2003
in Response to Office Action mailed on Jan. 09, 2003

Application Title:

PERMREACTOR AND SEPARATOR TYPE FUEL PROCESSORS FOR PRODUCTION OF HYDROGEN AND HYDROGEN, CARBON OXIDES MIXTURES

Remarks

After the telephone conversation of first inventor Mr. Vasileiadis with Examiner Mr. Vanoy on March 26, 2003, and the receipt of the related mailed new documentation by the Examiner which states: "a petition could be filed to request examination of non-elected claims" the following relevant petition is filed:

Both inventors of this application (Mr. Vasileiadis and Ms. Ziaka) petition that the following claims which are listed below be re-examined for allowance purposes.

Claims 138, 140, 141, 142, 144, 147, 156, 158, 159, 160, 162, 165, 174, 178 define distinct process steps in the patent that are sequentially performed.

The inventors request that these claims re-examined for reinstatement purposes from earlier cancellation request on March 28, 2003. This petition is based on the following reasons:

Even if these claims were classified as directed to a non-elected invention by the Examiner on the Jan. 09, 2003 response, we petition that the requirement be traversed. This is on the grounds of electing the process of the hydrocarbon and alcohol reformation reactions to produce hydrogen followed by the process of using the hydrogen as a fuel as discussed in the Examiner's Response dated Oct. 1, 2002.

There are several patents which include the process of reformation reaction and the process of hydrogen usage (example: Patent: 5,229,102, Jul.20, 1993, Minet and Tsotsis). Also, the apparatus for reformation reaction (reformer) and the method for reforming with catalyst usage (example: Patent: US2001/0009653 A1, July 26, 2001, Clawson et al.). Also the process for production of hydrogen and the apparatus (reformer) for the production of hydrogen (example: Patent: 5,861,137, Jan. 19, 1999, D.J. Edlund) These patents use election with traverse to disclose and claim more than one invention within the patent. In our patent, this election with traverse is based on the purpose and necessity of integration of process 1 (reformation reaction to produce hydrogen) with process 2 (hydrogen usage as a fuel). The two processes become indistinct and are integrated into one unified invention as disclosed in the patent. The technical usefulness

of our unified invention becomes this way substantial and retains the merits of the enclosed concepts. Therefore, the inventors request the allowance of these claims in the final patent.

The applicants request that the latest claims: 134, 135, 136, 137, 152, 153, 154, 155, 170, 171, 172, 173, submitted with the March 28, 2003 response, and claims: 138, 140, 141, 142, 144, 147, 156, 158, 159, 160, 162, 165, 174, 178 submitted with the April 4, 2003 petition be renumbered from 1 to 26.

Re-examination of non-elected claims Request

April 4, 2003

Inventors: S. Vasileiadis and Z. Ziaka

Application Number: 09/525,176

Continuation in Part of Application 08/595,040
Now US Patent 6,090,312

Use of revised format for claims according to Febr. 25, 2003 amendment.

Use of strikethrough for deleted matter, eg. ~~Permeate~~

Use of underlining for added matter, e.g., permeate stream

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138. (amended) The process of claim 134, with the reject exit stream from the most inner and next inner annular zones to have the contained steam removed by condensation. and subsequently be passed through a membrane permeator wherein the contained in stream hydrogen and carbon dioxide gases are separated by permeation via a polymer or composite membrane and the non permeated hydrocarbons, alcohols, and carbon monoxide exit from the non-permeate side of the permeator as a reject stream, with the separated hydrogen and carbon dioxide product mixture to be used as a combined fuel-oxidant feed in a molten carbonate fuel cell.

140. (amended) The process of claim 138, wherein the reject stream from the permeator containing each one or a mixture of unreacted hydrocarbons, alcohols, and carbon monoxide is recycled into the initial catalytic most inner reforming zone for continuous reforming reaction.

141. (amended) The process of claim 134, with the reject exit stream from the most inner and next inner annular zones to have the contained steam removed by condensation and subsequently passed through a cryogenic separator wherein the contained in stream hydrogen and carbon monoxide are separated as gases, while the hydrocarbons, alcohols, and carbon dioxide are separated as condensed liquids, and after heating are recycled back into the inlet of the preceding most inner catalytic reforming zone, with the separated hydrogen and carbon monoxide product mixture coming from the cryogenic separator to be used in following listed consecutive applications, for fuel

gas in solid oxide and molten carbonate fuel cells. for fuel gas in gas turbines and gas engines.

142. (amended) The process of claim 141 wherein the reactant hydrocarbon is methane. and the reactant alcohol is methanol.

144. (amended) The process of claim 134, wherein the reject exit stream consists of hydrogen. carbon monoxide and unreacted steam and enters as a fuel gas feed into a solid oxide or -a molten carbonate fuel cell for continuous generation of electricity. with part or all of the permeate hydrogen coming out of the preceding membrane zone to be fed as well in the fuel cell anode inlet in order to provide for the supplementary hydrogen fuel feed.

147. (amended) The process of claim 134 wherein the permeate hydrogen from the membrane zone is used as fuel feed in a consecutive fuel cell for continuous generation of electricity. with the fuel cell to be one of the listed types: solid oxide, molten carbonate. proton exchange membrane, phosphoric acid, alkaline.

156. (amended) The process of claim 152, with the reject exit stream from the far outer and next inner annular zones to have the contained steam removed by condensation. and subsequently be passed through a membrane permeator wherein the contained in stream hydrogen and carbon dioxide are separated by permeation via a polymer or composite membrane and the non permeated hydrocarbons, alcohols, and carbon

monoxide exit from the non-permeate side of the permeator as a reject stream, with the separated hydrogen and carbon dioxide product mixture to be used as a combined fuel-oxidant feed in a molten carbonate fuel cell.

158. (amended) The process of claim 156, wherein the reject stream from the permeator containing each one or a mixture of unreacted hydrocarbons, alcohols, and carbon monoxide is recycled into the preceding catalytic far outer reforming zone for continuous reforming reaction.

159. (amended) The process of claim 152, with the reject exit stream from the far outer and next inner annular zones to have the contained steam removed by condensation and subsequently passed through a cryogenic separator wherein the contained in stream hydrogen and carbon monoxide are separated as gases while the hydrocarbons, alcohols, and carbon dioxide are separated as condensed liquids, and after heating are recycled back into the inlet of the preceding <u>far outer</u> catalytic reforming zone, with the separated hydrogen and carbon monoxide product mixture coming from the cryogenic separator to be used in following listed consecutive applications, for fuel gas in solid oxide and molten carbonate fuel cells, for fuel gas in gas turbines and gas engines.

160. (amended) The process of claim 159 wherein the reactant hydrocarbon is methane and the reactant alcohol is methanol.

162. (amended) The process of claim 152, wherein the reject exit stream consists of hydrogen, carbon monoxide, and unreacted steam which enters as a fuel gas feed into a solid oxide or molten carbonate fuel cell for continuous generation of electricity, with part or all of the permeate hydrogen coming out of the preceding membrane zone to be fed as well in the fuel cell anode inlet in order to provide for supplementary hydrogen fuel feed.

165. (amended) The process of claim 152 wherein the permeate hydrogen from the membrane zone is used as fuel feed in a consecutive fuel cell for continuous generation of electricity, with the fuel cell to be one of the listed types: solid oxide, molten carbonate, proton exchange membrane, phosphoric acid, alkaline.

174. (amended) The process of claim 170 wherein the combined permeate from the membrane hydrogen and carbon dioxide gas mixture is consumed as fuel-oxidant in a consecutive molten carbonate fuel cell.

178. (new) The process of claim 170 wherein the reject exit stream consisting of hydrogen and carbon monoxide enters as fuel gas feed in the anode of a consecutive solid oxide or molten carbonate fuel cell for continuous generation of electricity.